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ABSTRACT

Two studies were conducted of students in grades 1-12 in Washington state to determine how children at various grade levels perceived males' and females' interest in using computers. A 46-item instrument was field tested using 124 students from three small school districts whose administrators had volunteered to participate. Four sections of an undergraduate educational psychology class also responded to the questionnaire. The interest questionnaire was then administered to 375 students in grades 1, 3, 5, 7, 9, and 11. Results indicated that, although children in the lower grades perceived computers as of interest to both sexes, this pattern underwent a reversal among seventh and ninth grade subjects. To follow up this observation, a second study was done and a revised instrument was administered to a minimum of two classrooms each in grades 1, 3, 5, 7, 9, and 11 in a medium-sized school district. Those results indicated that first graders rated interest in computers significantly higher than students at all other grade levels, and the majority of both boys and girls see boys as having a higher degree of computer interest than girls. Data tables and graphs illustrate the findings. (JB)

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STUDENTS' PERCEPTIONS OF INTEREST IN USING COMPUTERS: BOYS, GIRLS OR BOTH?

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RATIONALE FOR THE STUDY

As the United States moves from an industrial toward an information society, computer literacy and efficacy become increasingly critical skills. Children who have hands-on access to computers from an early age are likely to develop skills and attitudes which will give them a distinct head start on youngsters who lack this experiential base. Some authors have suggested that unless questions of equal access are addressed, the development of a technological elite could perpetuate or even exacerbate existing inequities based on socioeconomic status or sex.

Kiesler, Sproull and Eccles (1983) have suggested that the computing culture of today has a strong male bias, and that females may be seriously handicapped in tomorrow's computer-intensive environment unless steps are taken to remedy the "man's stuff" image that discourages girls' interest. Kiesler et al., presented several convincing lines of indirect evidence suggesting that computers are seen as more male- than female-appropriate, and hypothesized that a male bias in the computer culture discourages females' interest in computing. For example, they pointed out that video-games, whether played on home computers or in arcades (the pool hall of the eighties) are predominantly variations on male oriented sports or adventure themes; the computing culture reinforces a kind of counter-establishment "punk" behavior focused on breaking codes, illegally pirating software and crashing timesharing systems.

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Previous investigators (Tryon, 1980; Brown, 1956) have found that children from an early age develop clear and consistent opinions about whether activities and associated objects are of interest primarily to girls, boys or both. Tryon showed a wide range of toys to children and found sets of toys clearly typed as masculine, feminine, or neutral. When a second sample of children was shown the toys, beliefs about who would be most competent in using the object closely paralleled interest ratings.

However, little empirical evidence is available on the extent to which computers actually are perceived by children as sex-typed, or on the developmental course of such sex typing, if it exists. The purpose of this study was to determine how children at various grade levels perceived males' and females' interest in using computers.

In addition, since many educational software materials utilize a videogame format, two videogame items (one with a masculine shoot 'em up format and the other Ms. Pacman) were included.

METHODS

A list of distractor items in which the target items were embedded was constructed using a composite of filler items from other children's interest studies (Brown, 1965; Downing & Thompson, 1977; Tryon, 1980) which included stereotypically masculine, feminine, and neutral items of interest. An item was judged to be stereotyped using Tryon's 70% criterion (masculine if at least 70% of both boys and girls indicated that the toy would be of interest to boys, feminine if at least 70% of both sexes indicated that girls would like to play with the item and neutral if at least 70% of girls and boys indicated that both sexes would be interested in playing with the toy). The computer and two videogame items (Ms. Pacman and Star Trek) were added, and list order was randomized.

The 46-item instrument was field tested using 124 students in grades 1-12 from three small school districts in southeastern Washington whose administrators had volunteered to participate. Four sections of an undergraduate Educational Psychology course also responded to the questionnaire.

Method

The interest questionnaire was administered to 375 students in grades 1, 3, 5, 7, 9, and 11 in an urban school district in Southern Washington. Teachers from two classrooms at each of these grade levels were recruited by the district superintendent. Two additional sections of the Educational Psychology course responded to the questionnaire. Students were asked to decide for each item whether boys, girls or both boys and girls would like to use the item.

Results of the first study are summarized in Table 1. The majority of both boys and girls at all grade levels believed that both sexes would like to use a computer. Differences between the proportion of boys and girls selecting "both" were significant only at grades 1, 7 and 9. First graders indicated their own sex would be interested when they did not choose "both", and this tendency was consistently observed on neutral filler items as well. In third and fifth grade, virtually all children perceived computers and most neutral items as of interest to both sexes. This pattern underwent a reversal among seventh and ninth grade subjects, who saw computers of more interest to boys. This tendency appeared on a number of neutral and science related items in addition to the target computer item. Spontaneous comments and questions from subjects suggested that although subjects agreed that both sexes would like to use various items including computers, the degree of interest perceived for boys and girls might differ. To follow up on this observation, a second study was conducted.

TABLE 1.

Percent of Subjects Responding: Boys, Girls, or Both by Grade and Sex for Computer-Related Items

Grade	1			3			5			7			9			12		
Response	Boys	Girls	Both	Boys	Girls	Both	Boys	Girls	Both	Boys	Girls	Both	Boys	Girls	Both	Boys	Girls	Both
ITEM 19: Who would like to use a computer?																		
Subject sex																		
Male	23.33	0.00	76.67	3.85	0.00	96.15	7.89	0.00	92.11	13.79	3.45	82.76	10.71	0.00	89.29	10.00	0.00	90.00
Female	0.00	3.57	96.43	0.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00	100.00	2.71	0.00	97.83	2.70	0.00	97.30
ITEM 27: Who would like to play Star Trek?																		
Subject sex																		
Male	70.97	0.00	29.03	32.00	0.00	68.00	39.47	0.00	60.53	41.38	0.00	58.62	39.29	3.57	57.14	25.00	0.00	75.00
Female	32.14	7.14	60.71	31.58	0.00	68.42	28.57	0.00	71.43	44.44	0.00	55.56	23.91	0.00	76.09	21.62	0.00	78.38
ITEM 31: Who would like to play Ms. Pacman?																		
Subject sex																		
Male	22.58	16.13	61.29	15.38	7.69	76.92	5.26	5.26	89.47	3.45	17.24	79.31	0.00	10.71	89.29	5.00	0.00	95.00
Female	0.00	46.43	53.57	2.63	21.05	76.32	3.57	17.86	78.57	0.00	22.22	77.78	6.52	10.87	82.61	2.70	5.41	91.89

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The revised instrument included the same 46 items but used a Likert-like 5-point response scale ranging from Very Little Interest to Very High Interest. The scale was administered to a minimum of two classrooms each in grades 1, 3, 5, 7, 9, and 11 in a medium-sized school district in a university and farming community in eastern Washington. At the first grade level, classrooms were matched on the basis of size. One classroom was randomly assigned to respond to the question "How interested would girls be in using this item?", and the other was asked to rate the interests of boys. For all other grades, Form A and Form B were alternated within classrooms so that half the students in a classroom responded to items by rating girls' interests, and the other half rated boys' interests.

Interest in Computers

Interest data were analyzed using a 2x2x6 factorial ANOVA with sex, form and grade as factors, and are summarized in Table 2.

There was no significant effect for sex of subject, indicating that boys and girls were responding similarly to the items, and had similar perceptions of both boys' and girls' interest in computers.

Graphing of the significant form by grade interaction (see Figure 1) revealed essentially parallel slopes with girls' interests rated lower than boys' at all grade levels except eleventh grade, where the cell mean for girls interest was almost equivalent to that of boys (3.64 and 3.75 respectively).

There was a significant main effect for the form variable (see Figure 2) with subjects rating boys' interest ($\bar{X}$=4.43) higher than the girls' interest ($\bar{X}$=4.03).

The main effect for grade was also significant, and showed a steady decline from grade 1 through 11 (see Figure 3). Scheffe's test (α=.05)

TABLE 2.

Analysis of Variance for Interest in Computer

Source	df	Sum of Squares	F
Sex	1	0.03	0.04
Form	1	27.23	33.20****
Grade	6	82.02	16.67****
Sex * Grade	6	6.41	1.30
Sex * Form	1	1.90	2.32
Form * Grade	6	11.96	2.43*
Sex * Form * Grade	6	3.68	0.75

Note. Sex = Boys or Girls; Form = Boys' Interest or Girls' Interest; Grade = 1 through 11.

*p < .05 ** p < .01 ***p < .001 ****p < .0001.

Figure 1.

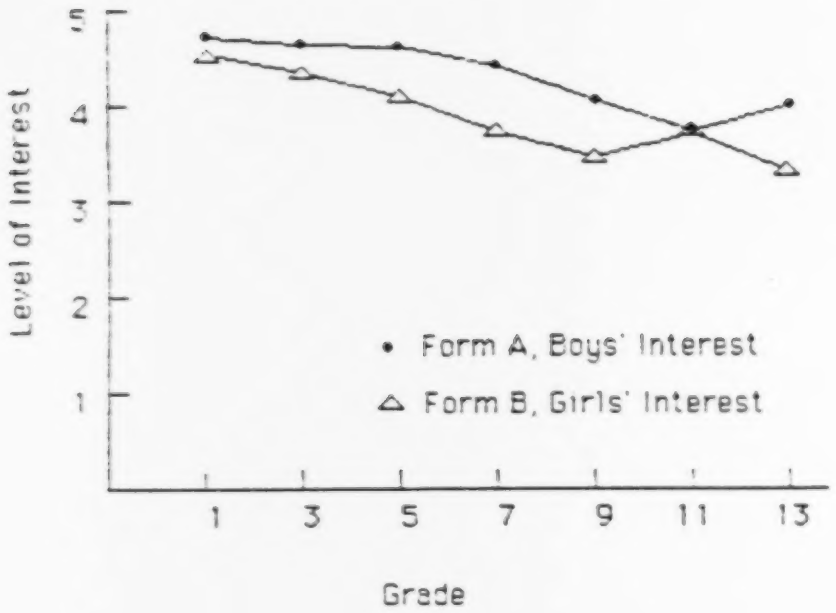

Figure 1 Form by Grade interaction for interest in using a computer

Figure 2.

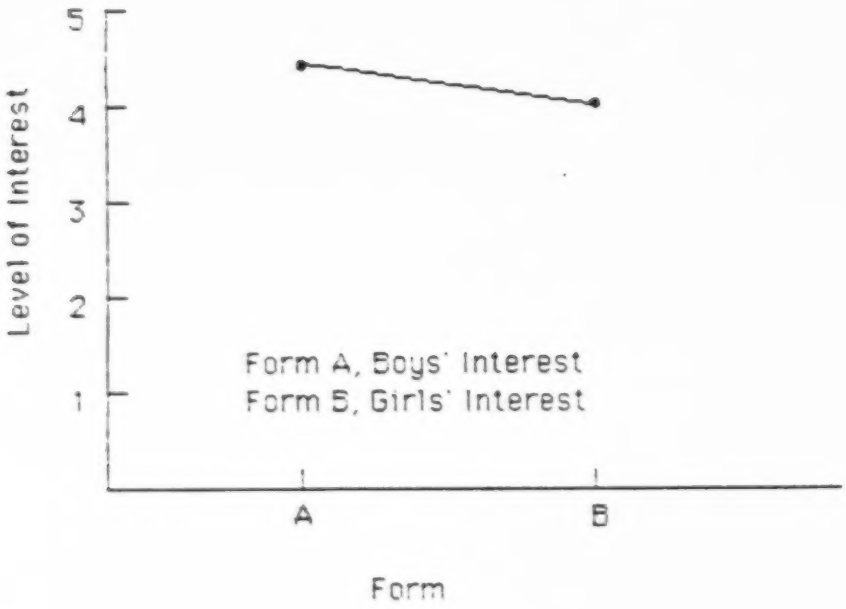

Figure 2. Form main effect for interest in using a computer.

Figure 3.

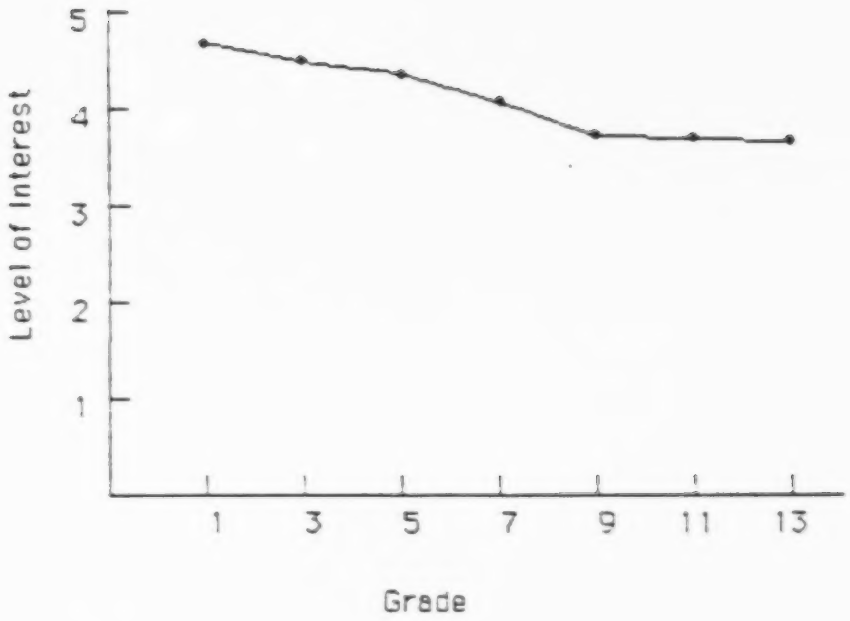

Figure 3 Grade main effect for interest in using a computer.

indicated that first graders rated interest in computers significantly higher than students at all other grade levels. Third graders rated interest in computers significantly higher than fifth graders, and fifth graders indicated more interest than seventh, ninth, and eleventh grade students. After seventh grade, there were no significant differences among grades.

In summary, the majority of both boys and girls perceived computers to be a neutral item of considerable interest to both sexes, but both males and females see boys as having a higher degree of interest in computers than girls.

Interest in Videogames

In this study, interest in using videogames was strongly influenced by game format. Results are summarized in Tables 3 and 4. When the game had a more masculine theme (Star Trek) boys were seen as more interested than girls, while the opposite was true when Ms. Pacman was the theme (see Figures 4 and 6). There was no effect of subject sex for either item, indicating both boys' and girls' perceptions of interest did not differ substantially.

Graphing of the significant form by grade interaction (see Figure 5) revealed more extremely divergent beliefs about the degree of interest in Ms. Pacman between those rating boys' and those rating girls' interests at some grade levels than at other levels; at no grade level, however, did subjects believe boys would be more interested in the game than girls.

The main effect for grade was significant for Ms. Pacman (see Figure 6). Scheffe's test indicated that fifth, ninth and eleventh graders did not differ from each other, but that those grades expressed significantly more interest in Ms. Pacman than did the first, third and seventh graders, who were essentially identical and lower in interest level.

TABLE 3.

Analysis of Variance for Interest in Videogame Star Trek

Source	df	Sum of Squares	F
Sex	1	0.35	0.24
Form	1	320.27	217.10****
Grade	6	19.26	2.18*
Sex * Grade	6	3.91	0.44
Sex * Form	1	3.00	2.03
Form * Grade	6	23.25	2.63*
Sex * Form * Grade	6	8.39	0.95

Note. Sex = Boys or Girls; Form = Boys' Interest or Girls Interest; Grade = 1 through 11.

*p < .05. **p < .01. ***p < .001. ****p < .0001.

TABLE 4.

Analysis of Variance for Interest in Videogame Ms. Pacman

Source	df	Sum of Squares	F
Sex	1	3.25	2.22
Form	1	398.93	273.24****
Grade	6	58.56	6.68****
Sex * Grade	6	3.54	0.40
Sex * Form	1	0.00	0.00
Form * Grade	6	28.34	3.24**
Sex * Form * Grade	6	13.21	1.51

Note. Sex = Boys or Girls; Form = Boys' Interest or Girls' Interest; Grade = 1 through 11.

*p < .05. **p < .01 ***p < .001. ****p < .0001.

Figure 4.

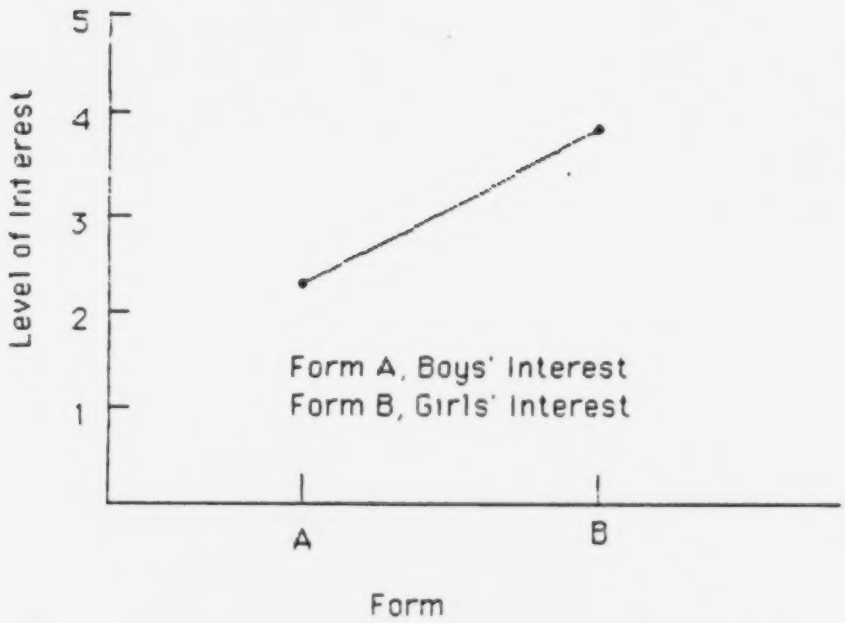

Figure 4 Form main effect for interest in using a videogame, Ms. Pacman.

Figure 5.

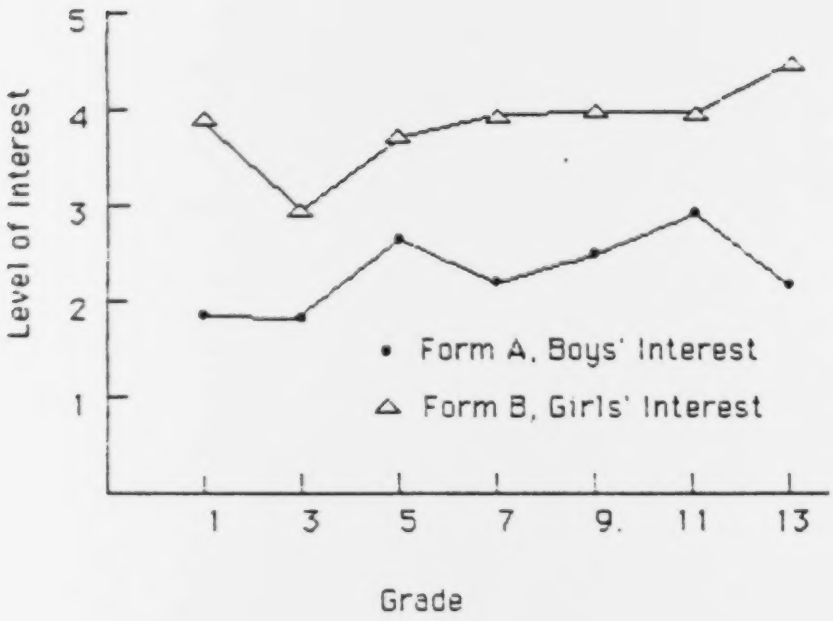

Figure 5 Form by Grade interaction for interest in using a videogame, Ms. Pacman.

Figure 6.

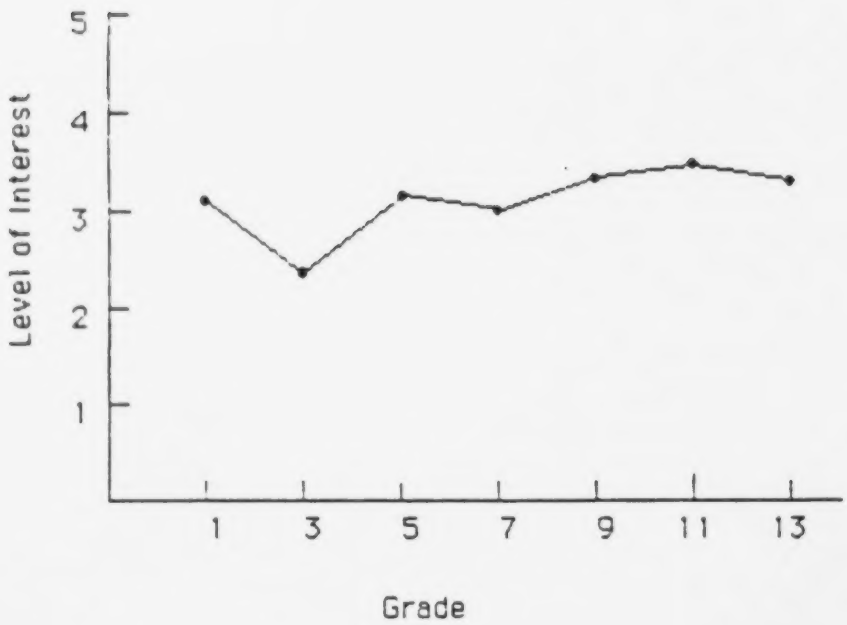

Figure 6. Grade main effect for interest in using a videogame, Ms. Pacman

The significant form x grade interaction was graphed (see Figure 7) and revealed essentially parallel lines with widely diverging beliefs about boys' and girls' interests at grade 11 than at the other grade levels.

DISCUSSION

For Star Trek, the main effect for form was again significant (see Figure 8), with boys percieved as more interested than girls. The main effect for grade was also significant (see Figure 9) but follow-up tests failed to show significant differences among any grade levels.

Computers were seen by subjects in this study as of considerable interest to both sexes. Male and female subjects had similar perceptions of the degree of interest boys and girls would have in using a computer, and both sexes saw boys' interest as significantly higher than girls'.

There was a decline in perceived interest as students' grade level increased. At all grade levels except eleventh, boys' interest was rated higher than girls, although the degree of discrepancy was not constant across grade levels.

The marked differences in interest patterns observed on the two videogame items when the content of the game was depicted as masculine (Star Trek) rather than feminine (Ms. Pacman) has implications for encouraging and supporting girls' continued interest. This finding suggests that thematic content of computer software might similarly influence children's interest in using the computer, and that possible sex bias should be an important consideration in software selection. This suggestion is supported by Malone (1981) who found that many educational software materials are cast in a game format, often modeled after more masculine oriented video arcade games, and that girls showed little

Figure 7.

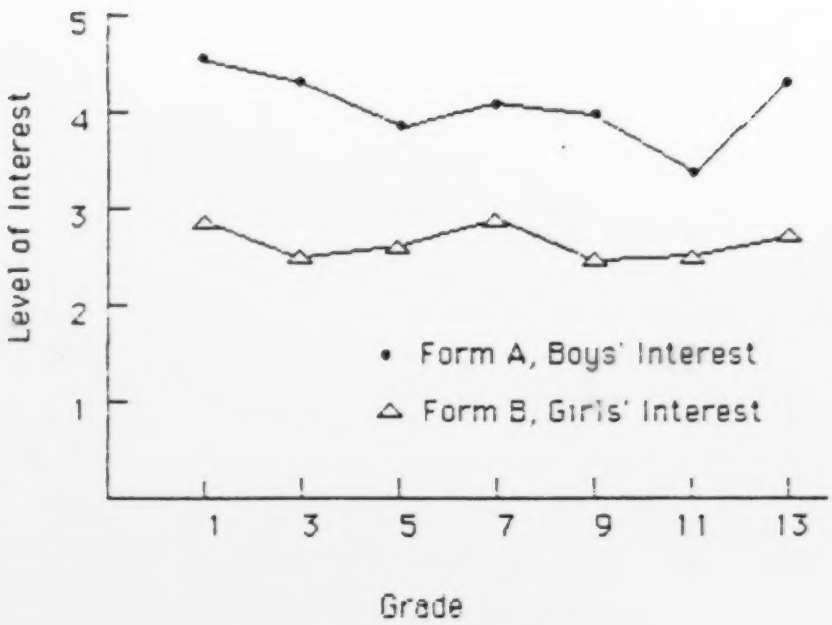

Figure 7. Form by Grade interaction for interest in using a videogame, Star Trek

Figure 8.

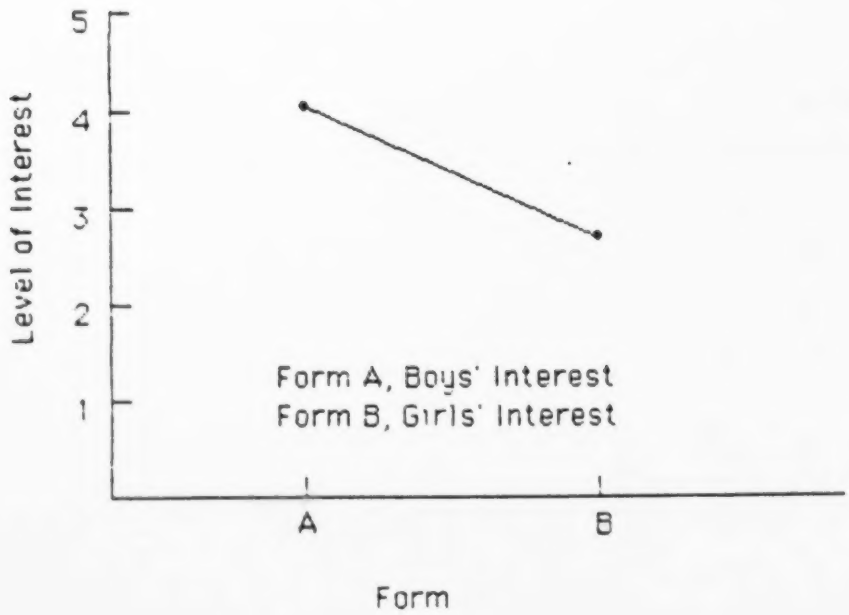

Figure 8 Form main effect for interest in using a videogame, Star Trek.

Figure 9.

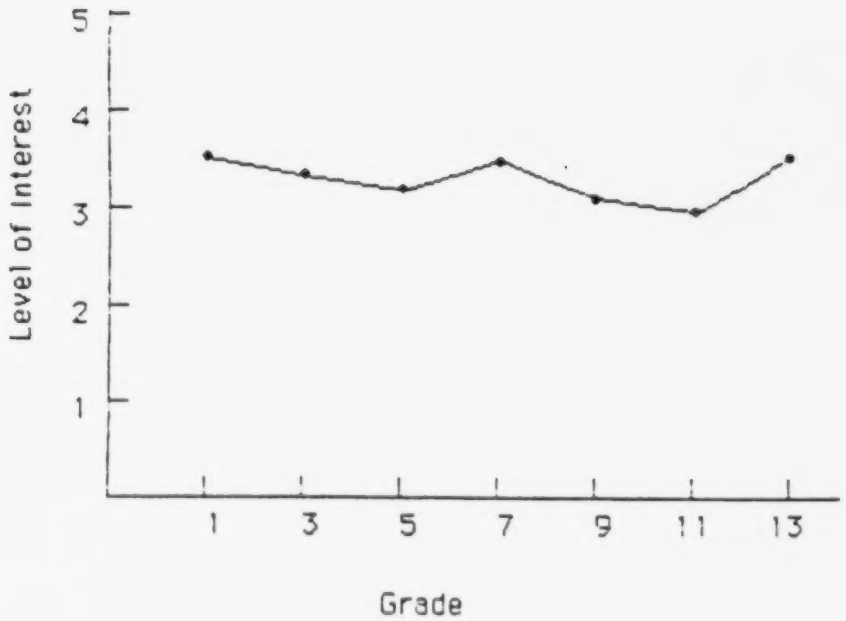

Figure 9 Grade main effect for interest in using a videogame, Star Trek.

interest in using such materials. When given access to more neutral materials which did not involve shooting and war games response formats, girls' use of and interest in materials substantially increased.

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